will be in conjunction with the crescent of the new moon at that time, and about 4½ degrees south.

On reference to my note-book I find that I obtained naked eye views of Mercury on 102 occasions between February 1868 and December 1899. But the planet was very rarely looked for here at the morning apparitions, and not always at really favourable spring elongations. If an observer with good sight made it a point to secure as many unassisted eye observations of this object as possible, he might be successful on about twelve occasions in a year. In a finer climate than ours, the planet may, of course, be more frequently seen. I think that some disappointments in regard to finding Mercury are due to the fact that observers scan the heavens at or after the time of maximum eastern elongations, instead of during a week or more preceding them. The phase and apparent brilliancy decrease rapidly at these periods. I have occasionally noticed Mercury as a very brilliant object about ten or twelve evenings before his greatest elongation, while at the date of his elongation he has appeared quite faint, and a few evenings later, become practically invisible, though above the horizon for about two hours after sunset.

My observations in various years have led me to the following conclusions regarding the visibility of the planet at the evening apparitions :—

(1) The greatest brightness of the planet is attained ten or twelve days prior to his greatest elongation.

(2) In February and March the planet may sometimes be caught twenty minutes after sunset, in April thirty minutes after sunset, and in May forty minutes after sunset. The stronger twilight towards midsummer occasions the difference.

(3) The duration of his visibility to the naked eye is about 1h. 40m. in March, 1h. 30m. in April, and 1h. 20m. in May. On a very exceptional occasion it is possible these limits may be exceeded.

(4) The planet is a conspicuous object, and certainly much brighter than a 1st mag. star. In February 1868 I considered that his lustre vied with that of Jupiter, then only 2° or 3° distant. In November 1882 he appeared brighter than Sirius. In 1876 he looked more striking than Mars, then 13° distant, but the latter planet was faint and at a considerable distance from the earth.

The greatest number of naked eye observations of Mercury at the same elongation was obtained at Bristol in the spring of 1876, when the planet was seen on thirteen different evenings. When Venus is near Mercury at a favourable time, she affords an excellent guide to the identification of the latter. But errors have often been induced, and either Venus or Jupiter has been mistaken for Mercury on many occasions. In April 1898 Venus was near Mercury, and some people, including a few regular astronomical observers, readily saw Venus and believed (and still ardently believe) that they were looking at Mercury.

The albedo, or reflecting capacity of the planet, is rated exceedingly low, being only 0·11, whereas Mars is 0·27, Saturn 0·50, and Venus and Jupiter 0·62. This is remarkable when we consider the occasional striking brightness of the small planet in a region of the sky full of strong twilight. By telescopic comparisons of the disc of Mercury with other planets, it is, however, easily seen that the former is relatively feeble in brilliancy. On May 12, 1890, I viewed Mercury and Venus in the same field of view of a 10-inch reflector, and remarked that the brilliant silvery light of Venus contrasted strongly with the much duller hue of Mercury. The probability is that the latter object is provided with a much thinner atmosphere than that which envelops his sister planet. There are undoubted markings visible on Mercury, but they are nothing like the peculiar representations of them which have been published in the last few years. The extreme difficulty of obtaining satisfactory views of the planet furnishes the principal reason why his rotation period still awaits accurate determination.

W. F. DENNING.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Junior Scientific Club, February 21.—Mr. H. B. Hartley (Balliol College) read a paper on liquid crystals, and showed, by microscopic demonstration upon the screen, experiments with para-azoxyanisol and para-azoxyphenetol which melt to doubly refracting liquids at 116° and 135° respectively. These remarkable bodies have not previously been shown in England; the curious transformations which they undergo were made clearly visible to a large audience.

CAMBRIDGE.—A very valuable and interesting collection of Irish antiquities, formed during the last seventy years by Mr. T. R. Murray, of Edenderry, has been acquired for the University by Prof. Ridgeway. It includes unique bronze weapons and ornaments, stone axes and arrowheads, medieval pottery, &c. The collection will be exhibited in the Fitzwilliam Museum on March 5.

A University Prize for the best M.D. Thesis has been founded in memory of Raymond Horton-Smith, M.A., M.B., late scholar of St. John's College, who, after a distinguished career in the University and at St. Thomas's Hospital, London, died last year at the untimely age of twenty-seven. Candidates must have taken honours in one of the Tripos examinations, and the Prize Thesis is to be printed and circulated.

The arrangement with Addenbrooke's Hospital, by which the Professors of Physic and Surgery are to have places on the staff, in consideration of an annual subsidy of 300*l.* from the University, is now submitted for adoption by the Senate. It has already been approved by the Hospital Court, and will probably come into effect forthwith. It puts an end to an old difficulty between the medical school and the hospital.

The thanks of the University are ordered for certain valuable gifts to the Engineering Laboratory. Lord Kelvin has presented a set of apparatus for electrical measurements, Messrs. Siemens Brothers a pair of coupled dynamos, and the Forward Engineering Company a gas engine.

The University Lecturer in Chemical Physiology, Mr. F. G. Hopkins, M.B., London, is to receive the honorary degree of Master of Arts.

THE Senators of Edinburgh University have decided to confer the degree of LL.D. upon Miss Eleanor A. Ormerod, in recognition of her services to entomology.

THE Senators of St. Andrews University have resolved to confer the honorary degree of Doctor of Laws upon Prof. McIntosh, Edinburgh, and Dr. Hugh Robert Mill.

THE Norwich Union Fire Insurance Company have just settled the claim of the West Ham County Borough Council, on account of the damage done in the disastrous fire at the Municipal Technical Institute last October, for the sum of 25,100*l.*, the Council retaining the salvage. This sum is expected to cover completely the cost of the reinstatement. The opportunity will be taken to enlarge the Institute, accommodation having already proved too small for the classes. A new block is to be built to contain the whole of the chemical department. This block will contain two lecture rooms, an advanced and an elementary chemical laboratory, furnace room, combustion room, gas analysis room, balance room, and private laboratory, together with the usual private rooms and store rooms. A small forge and a foundry are to be added to the engineering department. The engine and dynamo laboratory, and the engineering laboratory are both to be enlarged, and extra accommodation will be provided for building-trade classes and for the Women's Department and Art Department, together with several extra class-rooms. The cost of these extensions is estimated at 8000*l.* The builders are busily engaged on the work of reinstatement, and it is fully expected that both new and old portions will be ready for use at the beginning of the new session in October next.

A COPY of an address recently delivered by Sir William White, K.C.B., F.R.S., at the Merchant Venturers' Technical College, Bristol, has been received. In the course of his remarks, Sir William White pointed out that what is wanted from the national point of view is increased individuality and intelligence among the workers engaged in manufactures and industries. A good technical institution provides the means for developing these qualities, and in such a college a student can find help and assistance in trying to obtain a fuller grasp of principles, and a better knowledge of fundamental principles upon which to base his own further efforts. An engineer, whatever his line may be, cannot be completely furnished with the means of carrying on his profession by studying it in the most completely equipped college that could be established; that is only one portion of his education. Until Technical Colleges came into existence, the system of training that was favoured, with

those whose means and leisure permitted, was that of pupilage. Now it is quite recognised that an alternative method of commencing training is afforded by well equipped Technical Colleges. In conclusion, Sir William White referred to the steps which have been taken in the organisation of educational work in Bristol, and to prevent over-lapping of the various institutions and authorities concerned with education. Prof. Wertheimer, the headmaster, reports that, acting on the suggestions of the Technical Instruction Committtee of the Bristol Town Council, the Governors of the Technical College have completed an agreement with the Bristol School Board, in virtue of which the evening class work of the Board and of this College, in science and technology, are so arranged as to avoid overlapping. In virtue of an agreement with the Bristol School of Art, the Art School of the College will be closed at the end of this session, and art students will be advised to attend the other school; the School of Art on its side will close its science classes and advise its students of science to attend the College. The relation of the Technical College to the University College does not appear to be mentioned in the report.

SCIENTIFIC SERIALS.

American Journal of Science, February.—Sedimentary rocks of Southern Patagonia, by J. B. Hatcher. Two years of further study have greatly augmented the results obtained since the first report. Chief among the additional observations and resultant modifications of the author's former views are :—(1) The discovery near Sandy Point, in the Strait of Magellan, of an entirely new series of Tertiary deposits several hundred feet thick, and underlying the Patagonian Beds. These new Tertiary deposits have already been noticed by Dr. A. E. Ortmann, and have been named by him the Magellanian Beds. (2) The discovery near Lake Pueyrredon of several distinct fossil-bearing horizons in the Cretaceous.—Explorations of the *Albatross* in the Pacific (II.), by Alexander Agassiz. The choice of Dolphin Bank, Tahiti, as a standard to determine the growth of coral turns out to have been unfortunate, as it is in the midst of an area comparatively free from corals. Only a few growing corals were found by the author, the top of the bank being entirely covered by Nullipores. After coaling at Tahiti, the *Albatross* left for a cruise in the Paumotus. The western islands are probably all on a great plateau connected perhaps by the 800-fathom line. The soundings, like those off the Fijis, show that atolls do not necessarily rise from great depths, and that in this characteristic atoll district atolls are found, it is true, with steep slopes, but rising from moderate depths.—Action of ammonium chloride upon analcite and leucite, by F. W. Clarke and G. Steiger. When analcite is heated with four times its weight of ammonium chloride, about one-half of the soda in the analcite is converted into chloride, while variable ammonia is retained. Other zeolites, like leucite, natrolite, laumontite, stilbite, chabazite, apophyllite, show a similar reaction, varying, however, to an extent which probably depends upon their molecular structure. A new means of studying the latter is thus provided.—Devonian strata in Colorado, by A. C. Spencer. Devonian and associated strata were deposited originally over an extensive area in the southern Rocky Mountain region, the boundaries of which are as yet entirely unknown.—Estimation of thallium as the acid and neutral sulphate, by P. E. Browning. The salt obtained by heating thallous chloride with sulphuric acid until the excess of the latter is expelled, and then raising the heat to redness, has the constitution of a neutral sulphate. The author tested whether this neutral sulphate, or the acid sulphate described by thallium, can be used for the estimation of thallium, and finds that it can be done, provided the conditions of temperature are carefully attended to.—Motion of a submerged index-thread of mercury in the lapse of time, by C. Barus. The author endeavoured to frame a theory to account for the observed gradual sinking of an index-thread of mercury in a vertical tube containing water. He proceeded on the supposition that water penetrates past the index-thread in a very thin sheet, but found that the thickness of the sheet would have to be far below that of a molecule of water. He eventually found that the sinking was due to the volume viscosity of glass. A four years' experiment showed that the sinking proceeds at a regularly retarded rate through infinite time.

Annalen der Physik (formerly *Wiedemann's Annalen*), No. 1.—A study on soap-bubbles, by O. Dörge. The author performs on a soap-bubble a cyclical electric process analogous to a Carnot cycle, the expansion and contraction being either at constant charge or at constant potential. He arrives at a law which states that no process is possible in which electric energy is transferred without loss or gain from one potential to another. This law corresponds to the second law of thermodynamics.—Diffuse reflection of light, by H. Wright. If the angle of incidence is constant, the intensity of reflected light varies as the cosine of the angle of reflection in the case of perfectly dull surfaces. The converse does not hold good, so that Lambert's law is only partially correct.—Electric conductivity of dilute amalgams, by A. Larsen. Experiments upon amalgams of lead, zinc, cadmium, tin and bismuth show that the metal contained in dilute liquid amalgams is dissociated, and that the degree of dissociation increases with the dilution and the temperature.—Stationary temperature of an electrically heated conductor, by F. Kohlrausch. The author supposes a conductor whose surface is protected from loss of heat, except two terminals, each of which is kept at a constant temperature and a constant potential. When the stationary state has been attained, all points at the same potential will also have the same temperature. The greatest quantity of heat will be developed in those metals in which the ratio of the thermal to the electrical conductivity is smallest.—Spark potential in gases, by A. Orgler. The author proposes a new definition of the "specific electric strength" of a gas, which gives a real constant for any given gas. If δ is the width of the gap, and A and B the spark potentials in the gas and in air respectively, the specific electric strength is the ratio $\frac{dA}{d\delta} : \frac{dB}{d\delta}$. It is units for air, 0·888 for carbonic acid, and 0·563 for hydrogen, whatever the width of the gap.—Molecular susceptibility of paramagnetic salts of the iron group, by O. Liebknecht and A. P. Wills. Jäger and Meyer's series of atomic susceptibilities of Mn, Fe″, Co, and Ni, in the ratio of 6 : 5 : 4 : 2, is not confirmed, the numbers obtained being 6·98 : 5·86 : 4·70 : 2. Wiedemann's series a, $a+b$, $a+\frac{3}{2}b$, $a+2b$ agrees rather better with facts, but a still closer approximation is obtained by putting $b=1{\cdot}25a$ instead of $1{\cdot}15a$. There is a sudden rise from chromium to manganese and ferric iron, and a gradual fall from the latter to cobalt, nickel and copper.—Molecular susceptibilities of salts of the rare earths, by H. du Bois and O. Liebknecht. There is a gradual rise from cerium to praseodymium and neodymium; a decided rise in samarium, gadolinium and erbium, and a sudden fall to ytterbium.—Magnetic viscosity, by Lizzie R. Laird. To preserve the initial or instantaneous magnetisation of a disc for measurement, it is kept in rotation, and the rise of intensity of magnetisation on stoppage is recorded by a photographic device.

THE number of the *Journal of the Royal Microscopical Society* for February 1900 contains a further instalment of Mr. F. W. Millett's Report on the recent Foraminifera of the Malay Archipelago, collected by Mr. A. Durrand; and a paper by Dr. H. C. Sorby, F.R.S., on the Preparation of Marine Worms as Microscopical Objects, the fluid used for removing the salt being a strong solution of glycerin. The character and arrangement of the blood-vessels are especially well brought out by this mode of treatment. Among the paragraphs relating to Microscopy may be especially mentioned an abstract of van Heurck's paper, from the *Annales de la Société Belge de Microscopie*, on Modern Apochromatic Objectives.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 18.—"An Experimental Investigation of the Thermodynamical Properties of Superheated Steam." By John H. Grindley, B.Sc., Wh.Sc. Communicated by Prof. Osborne Reynolds, F.R.S.

In Regnault's experiments on the relations between the pressure, temperature, and latent heats of saturated steam, the steam to be experimented upon was obtained by withdrawing it upwards from a boiler, allowing any entrained moisture to be separated by gravity. Saturated steam obtained in any other manner would not necessarily have the same total heat of evaporation as that obtained by Regnault.

Whether the steam could always be brought into the same condition, as regards its freedom from moisture, by such a process of drainage was open to question, and it remained to be deter-